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ENVIRONMENT DEPARTMENT

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Memorandum

To: **LaDonna Turner, Site Assessment Manager,
Technical and Enforcement Branch,
U.S. Environmental Protection Agency, Region 6**

From: **Dana Bahar, Manager, Superfund Oversight Section,
Ground Water Quality Bureau, New Mexico Environment Department**

Date: **March 31, 2011**

Subject: **Pre-CERCLIS Screening Assessment of Moe No. 4 Mine, Ambrosia Lake Mining District, McKinley County, New Mexico: Further Action Under CERLCA Recommended**

Site name	Moe No. 4 Mine	**Street address**	NA		
City	NA	**State**	New Mexico	**Zip code**	NA
County	McKinley County				
Latitude	35°18'49.61' N	**Longitude**	107°48'49.20 W		

Site physical description:
The Moe No. 4 Mine (Site) is located approximately 7 miles southwest of the junction of State highways 509 and 605 (Figure 1). The Site is one-half mile east of State highway 605 on New Mexico State Trust Land. Access to the Site is through private property. The Site is a small underground mine situated on approximately 3 acres, adjacent to the eastside of San Mateo Creek, an ephemeral stream. The Site consists of a 30 degree partially collapsed decline to the northeast into the Todilto limestone, also a collapsed working of approximately 10,000 square feet by 12 feet deep. The Site includes approximately 45 small piles of waste rock and ore having an estimated volume of approximately 400 cubic-yards. The Site has a small 10 foot high wooden headframe that is visible from State highway 605 (Ref. 1).

Site identification:
The Site is one of approximately 97 legacy uranium mines identified within the Ambrosia Lake mining district of the Grants Mineral Belt (Ref. 2).

Site summary:
Mining activities at the Site commenced in 1961 and ended in 1963. The uranium deposit was situated in the Todilto limestone strata. The Site produced 2,407 tons of ore that produced 9,746 pounds (lbs.) of uranium oxide and 21,628 lbs. of vanadium oxide (Ref. 4). The Site is a small underground mine situated on approximately 3 acres which immediately adjoins the San Mateo Creek. There are approximately 45 small waste rock and ore piles spread throughout the Site. The Site is on State Trust Land. To date the Site has not been reclaimed.

The Site has been identified as discharging 100 gpm of mine water to San Mateo Creek from the workings

during its operation (Ref. 2). There is no evidence that the mine water was collected in a surface detention area or received any pre-treatment before being discharged to the San Mateo Creek . There is no known water quality data for the water discharged from the Site. Ground water is relatively shallow in the area of the Site. A monitoring well along San Mateo creek approximately 1,200 feet from the Site has ground water at 30 ft bgs.

A radiological survey in 2008 by Souder Miller and Associates for measurements taken at the Site at the ground surface showed a maximum of 1,100 micro Roentgen per hour (μR/hr) and a minimum of 12 μR/hr. Measurements at a four foot elevation showed a maximum of 1,000 μR/hr and a minimum of 14 μR/hr. The ground surface at the headframe displayed readings of 1,100 μR/hr. The background radiation level was approximately 15 μR/hr (Ref. 3).

Targets:
The area surrounding the Site is predominately range land. The Site is located adjacent to the San Mateo Creek channel. Contaminants from waste rock piles could potentially impact the surface water system via runoff to arroyos/ephemeral streams.

The nearest domestic well is approximately 1.2 miles from the Site. Table 1, highlights probable domestic wells within a 4 mile radius of the Site (Ref. 5). Table 2, identifies domestic wells that were sampled by NMED in 2009. Results show ground water concentrations exceeding the Environmental Protection Agency (EPA) Maximum Contaminant Levels (MCL) and the New Mexico Water Quality Control commissions (NMWQCC) ground water standards.

Site ownership and Potential Responsible Parties:
L. Sutton and E.P. Moe are listed as the Site operators from 1959 through 1963. Ruth Mining and Drilling Co. sunk the shaft in 1961 (Ref. 2). The State Mine Inspector's Office last registered the mine in June, 1962 with the operator listed as Lloyd Sutton (Ref. 1).

File review:
The references listed below were reviewed for the development of this pre-CERCLIS screen.

Site reconnaissance:
The last site reconnaissance occurred in 2008. Souder Miller and Associates a contractor to the NMEMNRD, Mines and Mineral Division performed a field survey for the Site (Ref. 3). NMED has not conducted a site reconnaissance.

Recommendation:
The Site is located adjacent to the channel of San Mateo creek. Ground water is shallow at this site, less than 30 feet below ground surface. The Site during operation pumped an estimated 100 gallons per minute from the mine workings directly to San Mateo Creek. To date no reclamation efforts have occurred at the Site. Based on the above conditions, NMED would recommend further investigation under CERCLA.

NMED also recommends assessment of sediments in the Site vicinity in order to evaluate the potential occurrence of impacts from dispersal of waste materials that have been left on-Site.

Currently, the existence of regional impacts from legacy uranium sites to the ground water system has not been determined. Ground water was pumped from the Moe No. 4 mine in order to access the ore deposits, but the final disposition of the discharged effluent is not known. A generalized investigation of potential alluvial ground water impacts from "wet" former uranium mines within the Grants Mineral Belt is recommended as part of regional ground water quality characterization. If this generalized investigation were to indicate a potential for alluvial ground water impacts, on-site installation of one or more monitor wells then should be considered.

References:

1. Anderson, Orin J., 1980, Abandoned or inactive mines in New Mexico. New Mexico Bureau of Mines and Mineral Resources Open-file Report 148.
2. New Mexico Energy, Minerals and Natural Resources Department, 2007, Abandoned and inactive uranium mines in New Mexico database, Mining and Minerals Division.
3. New Mexico Energy, Minerals and Natural Resources Department, July 2008, Abandoned Uranium Mine Field Survey Project, Moe No. 4 Mine Report, prepared by Souder Miller and Associates for the Mining and Minerals Division.
4. McLemore, Virginia T. and William Chenoweth, revised 1991, Uranium mines and deposits in the Grants district, Cibola and McKinley Counties, New Mexico. New Mexico Bureau of Mines and Mineral Resources Open-file report 353.
5. New Mexico Office of the State Engineer, 2011, New Mexico water rights reporting system database, point of diversion by location, four mile radius of Moe No. 4 mine.

Table 1. Wells within 4 Mile Radius of Moe No. 4, New Mexico Office of the State Engineer

Well File Number	Well Use	Well Owner	Section	Township	Range	Depth of Well (ft)	Depth of Water (ft)	Water Column (ft)
Mile (<1 mile)								
SP 03384	Irrigation[a]	(b) (6)	32	13N	09W	*	*	*
B 00415	Monitoring		32	13N	09W	59	30	29
B 00415	Monitoring		32	13N	09W	72	30	42
B 00415	Monitoring		32	13N	09W	54	30	24
B 00415	Monitoring		32	13N	09W	57	32	25
Mile (>1 and < 2 miles)								
B 01783	Livestock[a]	(b) (6)	31	13N	09W	700	300	400
B 01485	Domestic		30	13N	09W	580	280	300
Mile (>2 and <3 miles)								
B 00521	Domestic	(b) (6)	*	*	*	320	198	122
B 01486	Livestock[a]		25	13N	10W	460	280	180
B 01713	Livestock		25	13N	10W	600	*	*
B 01480	Domestic		25	13N	10W	*	*	*
G 01106	Domestic		25	13N	10W	*	*	*
B 00778	Livestock[a]		08	12N	09W	*	*	*
B00778	Livestock[a]		08	12N	09W	*	*	*
B 01341	Multiple Domestic Households		09	12N	09W	300	*	*
B 00861	Domestic		22	13N	09W	*	*	*
B 01458	Domestic		07	12N	09W	702	126	576
B 01340	Domestic		09	12N	09W	300	*	*
B 00659	Domestic		22	13N	09W	220	190	30
B 01771	Domestic		12	12N	10W	600	360	240
B 00188	Prospecting		02	12N	10W	905		
Mile (>3 and <4 miles)								
B 01636	Domestic	(b) (6)	22	13N	09W	260	80	180
B 00415	Domestic		22	13N	09W	95	72	23

Table 1 continued

B 01115	Domestic	(b) (6) [redacted]	15	13N	09W	478	204	274
B 00113	Domestic		18	12N	09W	100	55	45
B 00120	Domestic		24	12N	10W	*	*	*
B 01104	Domestic		14	13N	09W	303	247	56

* = Value unknown

[a] = Well is Permitted for Household Use

Table 2. Wells Sampled within a Four Mile Radius of the Moe No. 4 Mine by NMED in 2009.

OSE Well Number	Well Use	Well Owner	Gross Alpha	Radium 226/228	Uranium	Selenium
			pCi/L		µg/L	
*	Livestock	(b) (6) [redacted]	**72.1**	0.18	**166**	**268**
B 01485	Domestic		**33.5**	0.11	**42.9**	26.3
*	Livestock		**56.2**	0.73	**117**	**434**
B 01104	Domestic		**16.0**	0.01	20.6	13.2
B 01115	Domestic		**46.6**	0.96	**63.9**	**73.6**
B 01636	Domestic		**20.7**	0.01	13.8	**66.2**
B 00659	Domestic		6.2	0.42	10.1	27.1
*	Domestic		**56.0**	2.9	2.0	2.0
*	Domestic		0.9	0.28	2.5	2

* = Not registered with the NMOSE

Bold = Exceeds the EPA MCL and or NMWQCC Ground Water Standard.

pCi/L = picoCuries/Liter

µg/L = micrograms/Liter

Figure 1. Moe No. 4 Mine Location, Ambrosia Lake Mining District, McKinley County, New Mexico